FACT SHEET

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THEATER HIGH ALTITUDE AREA DEFENSE SYSTEM FLIGHT TEST PROGRAM

U.S. Ballistic Missile Defense Strategy & THAAD

Over the past several years, the U.S. has become increasingly concerned about the possible proliferation of theater ballistic missiles and weapons of mass destruction in many of the world's high-threat regions. Ballistic missile defense (BMD) is designed to counter this problem by: (1) providing a theater missile defense (TMD) for U.S. forces deployed abroad; and (2) devaluing ballistic missiles as strategic assets, thereby dissuading countries that desire a missile capability for aggressive purposes.

The Theater High Altitude Area Defense (THAAD) system fits into this strategy as one of the Ballistic Missile Defense Organization's (BMDO) core BMD systems. The THAAD system represents a land-based upper tier TMD system that will engage short, medium, and long range theater ballistic missiles.

The THAAD system's ability to intercept missiles at long range and very high altitude (endo- and exo-atmospheric) will give U.S. forces an early opportunity to shoot down incoming missiles and the best chance to knock them out far enough away so that post-intercept debris will not harm our troops — a vital consideration if a missile carries a weapon of mass destruction. Furthermore, this ability will give U.S. BMD forces the time to judge the success of an intercept attempt and, if necessary, launch more interceptors from THAAD or other missile defense systems.

Background

The THAAD System has conducted eleven Program Definition and Risk Reduction (PDRR) flight tests; it achieved its first successful body-to-body intercept of a theater ballistic missile target on June 10, 1999, during Flight Test 10. On August 18, 1999, following a second intercept (Flight Test 11; August 2, 1999), the Undersecretary of Defense for Acquisition, Technology, and Logisitcs instructed the Army to cancel remaining PDRR flight tests and begin preparations for Engineering and Manufacturing Development (EMD). A successful Milestone II Review was held in June 2000 and the EMD contract was subsequently signed on 28 June 2000. All PDRR flight tests were conducted at White Sands Missile Range, New Mexico. During EMD, flight tests will start off at WSMR, but transition to Kwajalein Missile Range to allow more threat representative engagement scenarios.

The THAAD Palletized Load System (PLS)

FLIGHT TEST HISTORY

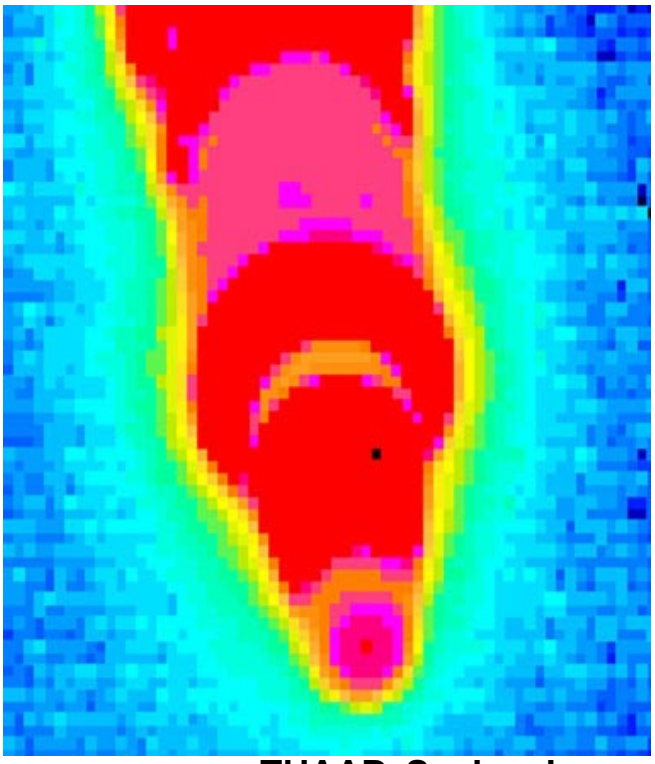
The PDRR first flight was at White Sands Missile Range (WSMR), N.M., on April 21, 1995. All test objectives were achieved: The test successfully demonstrated missile launch, booster performance, booster/kill vehicle (KV) separation, KV shroud separation, radar-to-missile communication, and flight/seeker environmental data collection. No target was flown on this flight test.

The second flight, also at WSMR, occurred on July 31, 1995. Data reviews indicate the THAAD missile achieved a significant portion of the flight test objectives. The flight tested the missile guidance and control system to verify missile response to radar provided target updates. The missile launched, executed the planned energy management steering maneuver, separated the kill vehicle from the expended booster, and the kill vehicle continued with mid-course guidance based on internal navigation update information sent from the surrogate radar. An objective of this test was collection of in-flight seeker performance data; this was not achieved due to early termination of the mission. Because the aft flare did not deploy, missile velocity at booster burnout was higher than planned. Though the missile calculated a new path to intercept the simulated target, range safety concerns led to automatic flight termination to avoid any debris leaving WSMR airspace and ground boundaries. Flight termination occurred before seeker data was collected. No target was flown on this flight test.

The third flight took place at WSMR on October 13, 1995. Because in-flight performance data on the seeker is critical to evaluate and understand kill vehicle performance and lethality, the collection of seeker data was made the primary objective of flight test 3. Though a STORM target was launched, the system executed a pre-planned, intentional fly-by due to post-intercept debris concerns. This was not an intercept attempt. The missile's seeker collected data on the target in the acquisition and track modes while the kill vehicle navigated to the required viewing area close to the target. Events leading up to the seeker acquisition of the target also appeared to perform as expected. Shortly after the target was launched, the THAAD Battle Management Command, Control, Communication, and Intelligence (BM/C3I) provided the fire control solution and the missile was launched. The missile executed an energy management steering maneuver, deployed the flare prior to kill vehicle/booster separation, unshrouded the seeker, and navigated to the area of closest approach using in-flight target updates provided by a surrogate radar.

The fourth flight took place at WSMR on December 13, 1995. The primary objective of the test was to hit (make physical contact with) the target. This firing was THAAD's first attempt to intercept a STORM target. The THAAD flight test was not successful in achieving the exoatmospheric intercept, but did have significant accomplishments. Analysis indicated that a software error in avionics processing caused the missile to perform an errant maneuver during flyout. This maneuver pulled the kill vehicle off course and required excessive consumption of divert fuel to get back on a path to intercept. The seeker properly acquired, designated, and tracked the target and was on course for a successful intercept until the Divert and Attitude Control System (DACS) fuel was depleted. The onboard avionics package continued to issue guidance correction commands which could not be executed due to depleted fuel. The THAAD Radar operated in the "shadow" (non-command) role and maintained a solid track on both the interceptor and target. As planned, the THAAD Battle Management system received targeting data from WSMR radars and provided in-flight commands for interceptor flyout to target.

The fifth flight took place at WSMR on March 22, 1996. The primary objective of the test was to intercept a HERA target. An intercept was not achieved. Preliminary investigations indicate that after booster separation the missile failed to execute in-flight command and control functions. Without this functionality, the missile flew on a ballistic trajectory past the target until the flight was terminated by range safety personnel. Analysis of the flight data determined that the primary cause of failure was a lanyard that malfunctioned in the interstage of the missile. The lanyard malfunction during booster separation led to a reset of the avionics computer into "Stand-by" mode. It continued on a ballistic trajectory until it was command destructed by WSMR Range Safety. The THAAD debris landed on WSMR, as planned in the event of a miss. Although the THAAD missile missed the target, the test did yield valuable information which will be used to determine what corrections are required to achieve successful intercepts on future missions. Correcting the problem found in this prototype development test will ultimately lead to a better ballistic missile defense system for the Army. This was the second THAAD flight to attempt an intercept and the first test in which all the THAAD components participated. The THAAD missile was launched for the first time from the THAAD Palletized Load System launcher. The THAAD Radar successfully shadowed the mission by tracking both the target and the interceptor.



THAAD Seeker Image

The sixth flight test was conducted at WSMR on July 15, 1996, and was an attempt to intercept a HERA target in the high-endoatmosphere. Though this flight demonstrated the best overall system performance to date, an intercept was not achieved. The system did demonstrate successful launch of the missile from the Palletized Load System launcher, BM/C3I fire control performance, and operation of the THAAD radar in shadow mode. In addition, corrective actions resulting from flight test 5 were demonstrated. A problem with the seeker electronics caused one-half of the focal plane array to be saturated; this overloaded the onboard signal processor and precluded target designation. Without target designation, the kill vehicle could not transition to closed loop guidance for endgame based on the seeker data. Thus, an intercept was not achieved. Post-flight investigation of flight test data and recovered debris identified contamination across adjacent electrical traces in the seeker electronics as the most likely cause of the observed anomaly. Corrective actions taken as a result of flight test 6 include: increased oversight during seeker and missile build-up, extensive pre-flight screening and testing of the seeker focal plane; avionics software modifications to allow target designation even in the event half the focal plane is saturated, and modifications to the inertial measurement unit firmware to better assure acquisition of the target by the seeker.

The seventh flight test was conducted at WSMR on March 6, 1997. The primary test objective – achievement of a body-to-body intercept in the high endoatmosphere – was not accomplished. The reason for the missed intercept has been isolated to the DACS. A key change in the flight test seven configuration was the participation of the THAAD radar as the prime surveillance and fire control sensor (vice WSMR FPS-16 range radars). The THAAD radar tracked both the target and the THAAD interceptor and successfully communicated the required in-flight target updates to the missile. Because the DACS motors did not operate properly, the missile was unable to execute the maneuvers necessary for intercept in response to these updates. Successful operation of the radar during this test represents a significant program achievement. In addition, the launcher and BM/C3I segments performed nominally.

THAAD flight test eight was conducted on May 12, 1998 at WSMR and did not achieve intercept. A boost phase anomaly—caused by a short circuit in the thrust vector control assembly—resulted in loss of missile control soon after launch and subsequent self-destruct of the missile. As demonstrated during previous flight tests, the radar, launcher, and battle management segments performed nominally. Flight test eight represented the first use of the User Operational Evaluation System (UOES) radar as the primary surveillance and fire control sensor supporting the engagement attempt.

FLIGHT TEST HISTORY (CONTINUED)

Flight Test 9 was conducted at WSMR on May 29, 1999 and a successful intercept was not achieved. The radar, launcher, and battle manager performed nominally, but the intereptor missed the target by an estimated 12 meters. The failure investigation converged on a suspect physical interface between the aft shock mount assembly and the kill vehicle (KV) shell as the most likely cause of a divert and attitude control system (DACS) failure. This, in turn, is believed to have caused the high environments inside the KV that likely compromised the telemetry system. The loss of flight test telemetry makes it difficult to determine with certainty the reason for the missed intercept, but excessive jitter that resulted from the inability to completely stablize the KV during endgame (due to DACS nozzle failure) is believed to be the reason why the KV failed to intercept the target. Corrective action was taken on the Flight Test 10 vehicle to preclude a repeat of the same failure.

Flight Test 10 was conducted on June 10, 1999 and a successful body-to-body intercept of the target in the high endoatmosphere was achieved. All system segments performed as planned and no major anomalies were experienced.

Flight Test 11 was conducted on August 2, 1999 and a sucessful body-to-body intercept of a separating target in the exoatmosphere was achieved. All system segements performed as planned and no major anomalies were experienced.

CONCLUSION

Following the second successful intercept, the Under Secretary of Defense for Acquisition, Technology and Logistics directed the Army to cancel remaining THAAD PDRR flight tests and to focus instead on preparations for entering EMD. Following the successful Milestone II review and contract award in June 2000, the THAAD program is currently in its early EMD design phase. No additional PDRR flight tests will be conducted; EMD flight tests will commence in the FY04-05 timeframe at WSMR, prior to transitioning to Kwajalein Missile Range for the remainder of flight testing.

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